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FAUNA OF THE PERMIAN OF THE CENTRAL UNITED STATES.

PART I.

BY J. W. BEEDE.

Read before the Academy December 29, 1901.

It is proposed to give under the above title a discussion of the stratigraphy, fauna and faunal relationships of the Permian of the Mississippi valley. An article is now in preparation on the fauna and stratigraphy of a portion of the Lower Permian (below the Red Beds). A preliminary note on the fauna of the Upper Permian (Red Beds) may be found in the forthcoming report of the Oklahoma Geological Survey.

The object of this paper is merely to bring to notice a few very interesting species not heretofore known, leaving most of the discussion of them to the later paper, where the fauna will be discussed more fully and the descriptions and figures of the fauna as a whole given.

NEW SPECIES FROM NEBRASKA.

The fossils herein described are from a valuable collection made in Gage county, Nebraska, by Prof. W. C. Knight. The discussion of the geology of this region will be found on page 357 of the eighth volume of the Journal of Geology.* The specimens herein described are now in the museum of the University of Nebraska.

Aviculopecten nebrascensis, n. sp. Plate XIII, figs. 3-3d.

Shell moderately large, quite convex, somewhat resembling *A. occidentalis* Shum. in general appearance. The posterior ear of the left valve is moderately small, the posterior margin being only slightly sinuated below it. The anterior ear is moderately well rounded in front, with deep sinus below; sulcus between the ear and body of the shell not very well defined. Hinge line about two-thirds the length of the shell; beak widens rapidly, slightly protruding. Except near the ears, the shell is moderately regularly rounded. The surface is marked by radiating striæ or costæ, sometimes wavy, and occasionally one is larger than the majority, increasing by implantation. The right valve is flat, with the byssal notch extending to the body of the valve; the markings of the body of the valve similar to those of the other half of the shell. Length, 33 mm.; height, 31 mm.; convexity, 10 mm.; length of hinge, 21 mm.

Permian, Gage county, Nebraska.

This species seems to be derived from *A. occidentalis*, and differs from it in the small posterior ear, great convexity, and the wide-angled beak.

Pinna? coprolitiformis, n. sp. Plate XIII, figs. 1, 1*b*.

Shell moderately small for the genus; angle of divergence large; hinge nearly straight; ventral margin apparently irregular; anterior end blunt. The entire shell is wrinkled vertically and has little the appearance of the usually graceful species of the genus. The markings and lines of growth are very indistinct in our specimens. These markings are very much like those of *Aviculopinna*, but are very faint and very fine. Length, 50 mm.; height in widest portion, 30 mm.; convexity, about 22 mm.

Permian, Gage county, Nebraska.

The generic position of this fossil is uncertain, as the beak is not well preserved. It seems to have more nearly the general form of a *Pinna* than of an

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*See, also, an article on the Blue Valley Permian, by the writer, in the Kansas University Quarterly for July, 1900, vol. IX, p. 191.

Aviculopinna, and it is provisionally referred to that genus. It is liable to be confounded with no other species of either genus. It is much more liable to be mistaken for a coprolite.

Aviculopinna knighti, n. sp. Plate XIV, fig. 2; plate XIII, fig. 6.

Shell extremely large, slightly arcuate, compressed laterally, and having a very small angle of divergence at the end. Cardinal ridge small compared with the size of the shell. The striæ meet the hinge at about a right or slightly oblique angle. They pass downward to about the middle of the shell, where they turn forward, as common among species of the genus. Both ventral and dorsal margins are similarly, though slightly arcuate. Length, 22 inches, with about a foot missing; height at widest place, 83 mm.

Permian, Gage county, Nebraska.

The beak of this fossil is missing, but the form and markings are such as to place it with all probability among the species of this genus. The young specimens of this species are remarkably long and narrow, presenting a peculiar appearance. It is named in honor of Professor Knight, who collected the type.

Aviculopinna nebrascenis, n. sp. Plate XIV, figs. 1–1d.

Shell moderately large, roughly triangular, compressed laterally, widening rapidly toward the posterior. Hinge line straight; marginal ridge moderately prominent; ventral margin slightly arcuate; posterior extremity meeting the hinge at an obtuse angle, the lower third rounding forward to meet the ventral margin. Beak very indistinct and very near the anterior end of the shell. The surface is marked by striæ passing slightly backward and downward two-thirds or three-fourths the distance across the shell, where they curve rather abruptly forward and downward, finally reaching the ventral margin as they fade out. The lines, as shown in the cast, are fairly approximate and not very prominent. They appear to be nearly parallel to the ventral margin on the lower quarter of the shell. Length, 107 mm.; height a little in front of the posterior end, 41 mm.

Permian, Gage county, Nebraska.

This species differs from *A. illinoiensis*, which it most resembles, in being higher, in having a straight hinge, less distinct markings, and larger. It differs from *A. pinnæformis* Geinitz, from the Permian of Europe, in not having any radiating striæ.

EXPLANATION OF PLATE XIII.

Pinna? coprolitiformis.

1. View of left side of specimen.

1*b*. Diagrammatic reproduction of the striæ from the middle to ventral margin of the opposite valve of another specimen.

Allorisma sp.

2 and 2*b*. The two valves of an *Edmondia*-shaped *Allorisma*.

Aviculopecten nebrascensis.

3. Flat valve, showing byssal notch.

3*b*. Convex valve, cast, showing form and markings.

3*c*. Outline of the same, showing convexity.

3*d*. Larger specimen, with wavy striæ and straight posterior side of shell.

5 and 5*b*. Pedicle and posterior view of an undetermined brachiopod.

Aviculopinna knighti.

6. Left valve of specimen as it appears, one-fourth natural size. All other specimens natural size.

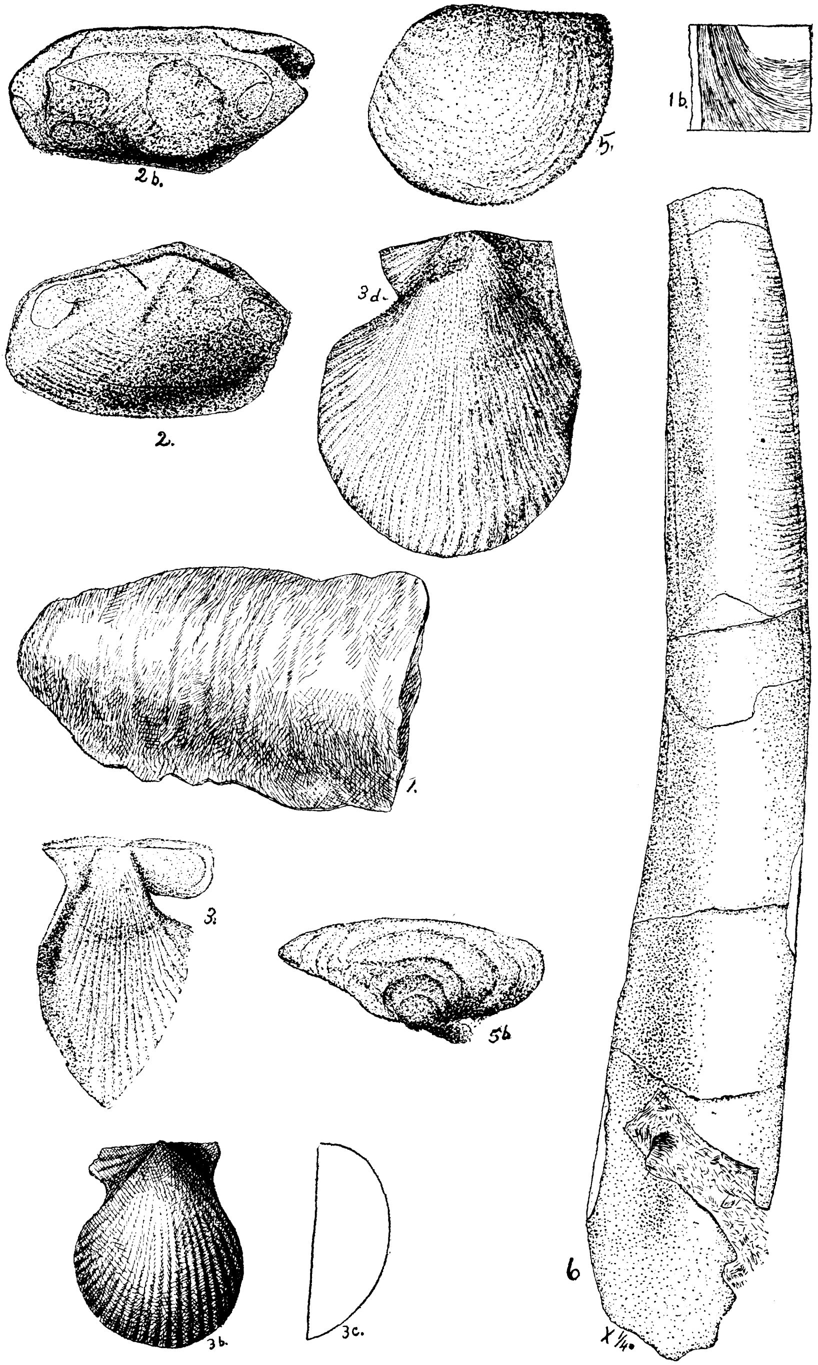

PLATE XIII. New Permian Invertebrate Fossils.
Drawn by J. W. Beede.

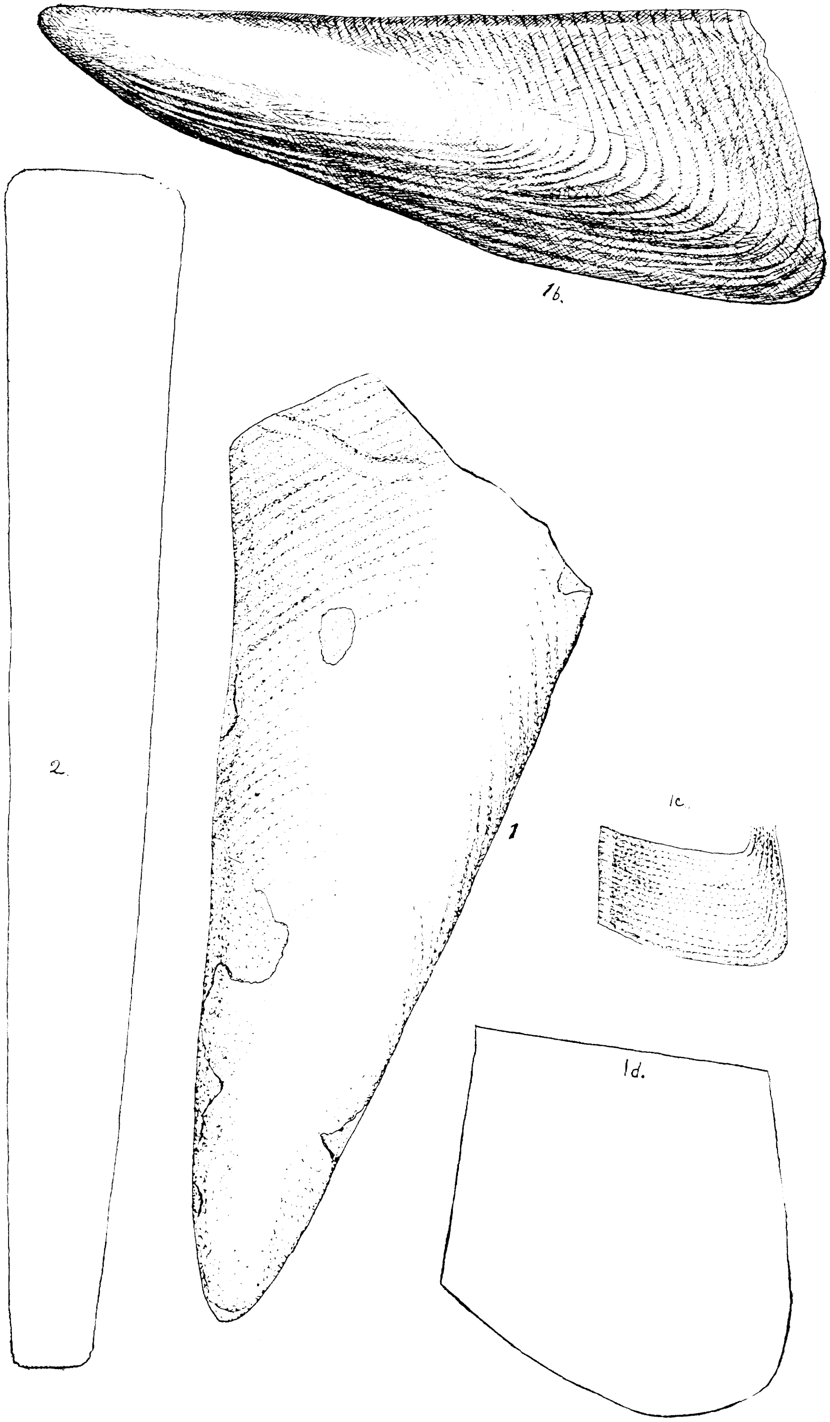

PLATE XIV. New Permian Invertebrate Fossils.
Drawn by J. W. Beede.

EXPLANATION OF PLATE XIV.

Aviculopinna nebrascensis.

1. Concave cast of valve, showing markings.
1*b*. Cast of type.
1*c*. Portion of another cast, showing direction of markings.
1*d*. Figure showing outline of posterior of shell. All natural size.

Aviculopinna knighti.

2. Outline of young specimen. One-half natural size.

THE AMERICUS LIMESTONE.

BY ALVA J. SMITH, EMPORIA.

Read before the Academy December 28, 1900.

The limestone under consideration in this paper is called the Americus limestone on account of its being extensively quarried near that village. It was thus denominated by Kirk in his Neosho river section, and is referred to by him on page 80, volume I, of the University Geological Survey, but it seems to have escaped identification in other localities.

The color of the Americus stone is a neutral drab, weathering to a light buff on account of the oxidation of the iron it contains. Its texture is even, compact, and semicrystalline; hardness, three. Its thickness varies in different localities, from sixteen to twenty-two inches, and it may be obtained in blocks of any required size. All points considered, it is by far the best building stone in Lyon county.

An analysis of the stone yields the following elements, approximately in the proportions given, viz.:

Silica (SiO_2)	6
Calcium carbonate ($CaCO_3$)	75
Aluminates and ferrous carbonate ($FeCO_3$)	12
Magnesium carbonate ($MgCO_3$)	6
	101

Fossil fauna are quite abundant, the upper portion containing great numbers of *Fusulina cylindrica;* while crinoid stems, *Productus costatus*, *Productus semireticulatus*, and *Spirifer camerata* and a species of *Retzia* are occasionally found in the lower portion, the *Retzia* being very abundant in the shale above, while the yellow shale beneath is apparently barren of fossils.

The adjacent strata, both above and below, are a series of thin-bedded limestones and shales, the shale assuming an arenaceous character about thirty feet below, while thirty-five feet above is the most productive *Fusulina* horizon that has come to my notice. They are there bedded together in a friable limestone about four feet thick, which disintegrates on exposure, freeing the little fossils by the million, so that they fill the soil in many places for hundred of yards below the outcropping formation.

There is a locality on Wolf creek, in the southwest corner of Lyon county, section 19, township 21, range 10, where they may be gathered with a shovel. This horizon is a prominent feature in the series and may frequently be used to locate the position of the Americus stone when it is covered.

The outcropping margin of the Americus stone may usually be recognized at a distance by the large, rectangular blocks, which are always in evidence where the ground surface is at all precipitous. Blocks measuring ten to twenty feet are